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DINOSAURS!

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DINOSAURS! is published by
Orbis Publishing Ltd
Griffin House
161 Hammersmith Rd
London W6 8SD

© 1994 Orbis Publishing

EDITORIAL & DESIGN
Tucker Slingsby
3G London House
66-68 Upper Richmond Rd
London SW15 2RP

N58 94 05 12
ISBN 0 7489 1658 X

Printed in Italy by Officine Grafiche
De Agostini, Novara

ANOMALOCARIS

The largest animal of its time, *Anomalocaris* was a real 'monster of the deep'.

More than 500 million years ago, the Early Cambrian seas seethed with activity. Some extraordinary creatures lived on the sea bed. Among this community of marine 'oddballs', the largest, *Anomalocaris,* was a nightmare vision.

STRANGE FIND

Anomalocaris was found in the Burgess Shale, a slab of rock from a mountain in British Columbia, Canada, which was once part of the sea bed. At first, experts thought that *Anomalocaris* was actually several different animals. Various parts of its body were mistaken for a worm, a jellyfish, a headless shrimp and even a squashed sea cucumber! Eventually, scientists worked out that all these amazing parts fitted together to form just one bizarre animal.

BURIED DEEP

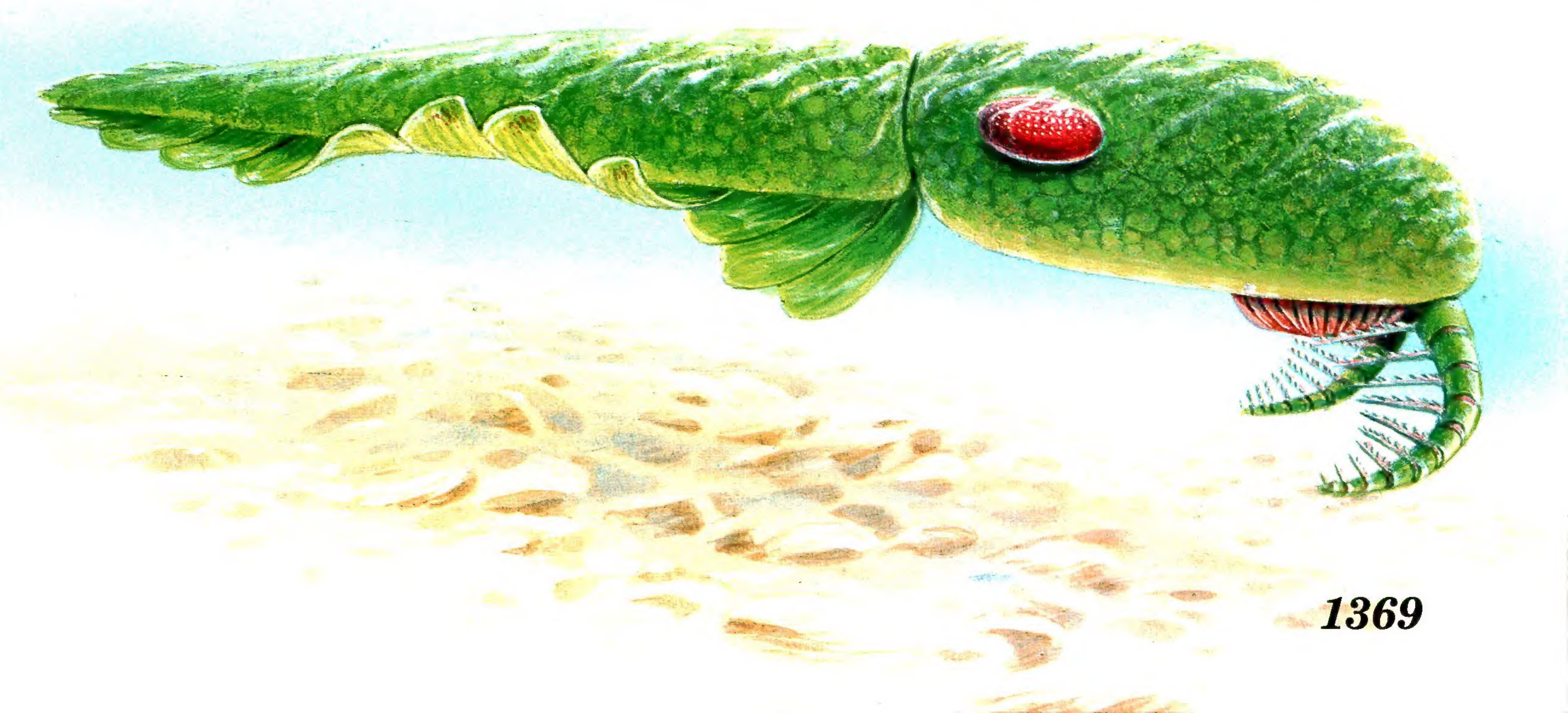
The fine-grained mud that buried *Anomalocaris* had preserved its remains in wonderful detail. Experts set about the task of putting together the 'jigsaw' of fossils to reveal what *Anomalocaris* actually looked like. The finished result was amazing.

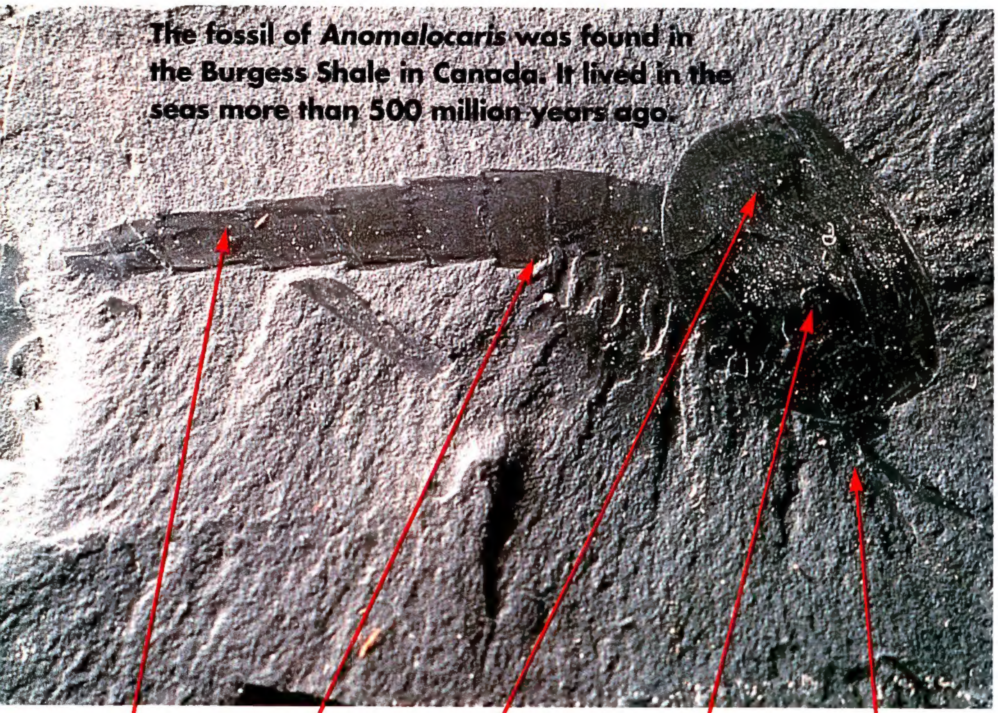
GRASPING CLAWS

Anomalocaris roamed the sea floor like a miniature spacecraft. It was a fearsome predator with great bulging eyes on short stalks, and it had a voracious appetite. It caught its prey with two terrifying, curved claws. Once a victim was in its grasp, *Anomalocaris* drew the unlucky creature down and under its huge, round head.

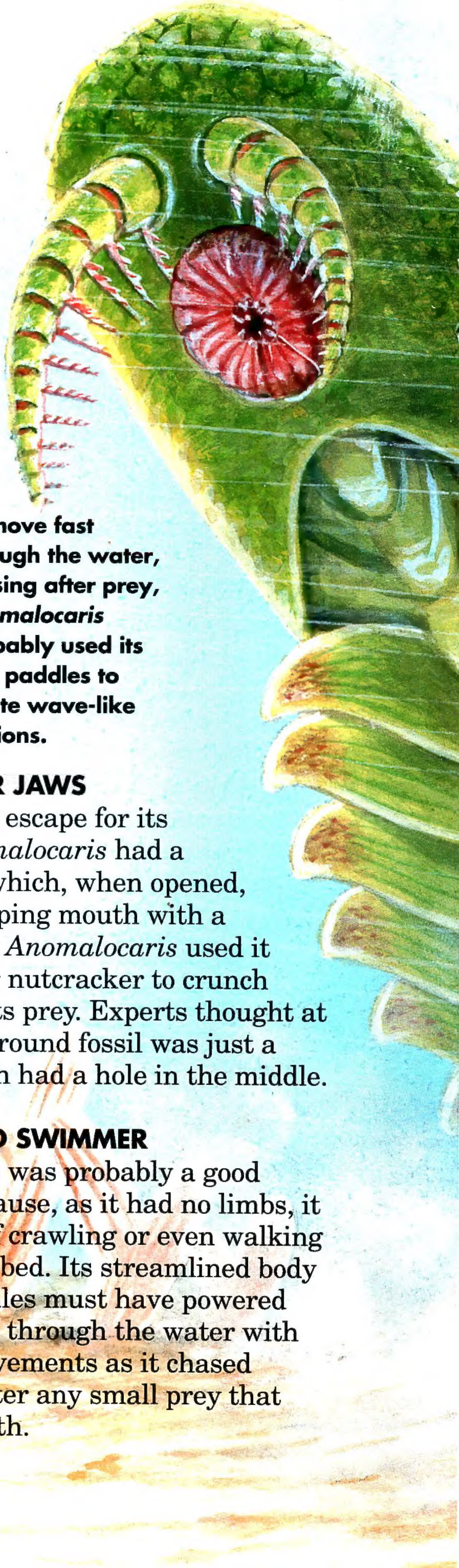
TERRIBLE TEETH

Inside its ever-open mouth, *Anomalocaris* had layers of sharp teeth and bony plates. These went some of the way down its gullet. Once inside the cavity, the crushed victim was shredded like cheese on a grater.





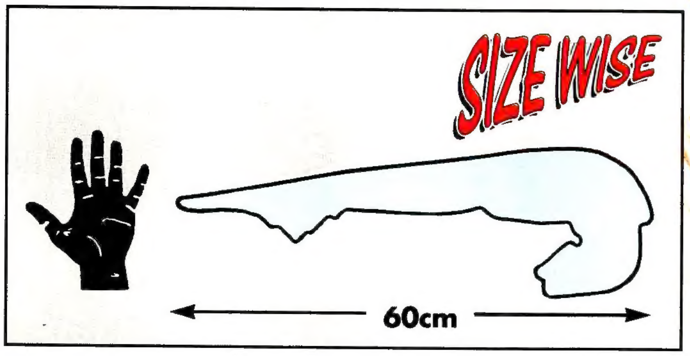
The fossil of *Anomalocaris* was found in the Burgess Shale in Canada. It lived in the seas more than 500 million years ago.



To move fast through the water, chasing after prey, *Anomalocaris* probably used its side paddles to create wave-like motions.

MONSTER FACTS

- **NAME:** *Anomalocaris* (a-nom-al-oh-kar is) means 'odd shrimp'
- **GROUP:** unknown
- **SIZE:** up to 60cm long
- **FOOD:** all sea creatures of the time
- **LIVED:** about 520 million years ago in the Early Cambrian Period in the seas in many parts of the world



NUTCRACKER JAWS

There was no escape for its victims. *Anomalocaris* had a circular jaw which, when opened, revealed a gaping mouth with a powerful rim. *Anomalocaris* used it like a sinister nutcracker to crunch and destroy its prey. Experts thought at first that the round fossil was just a jellyfish which had a hole in the middle.

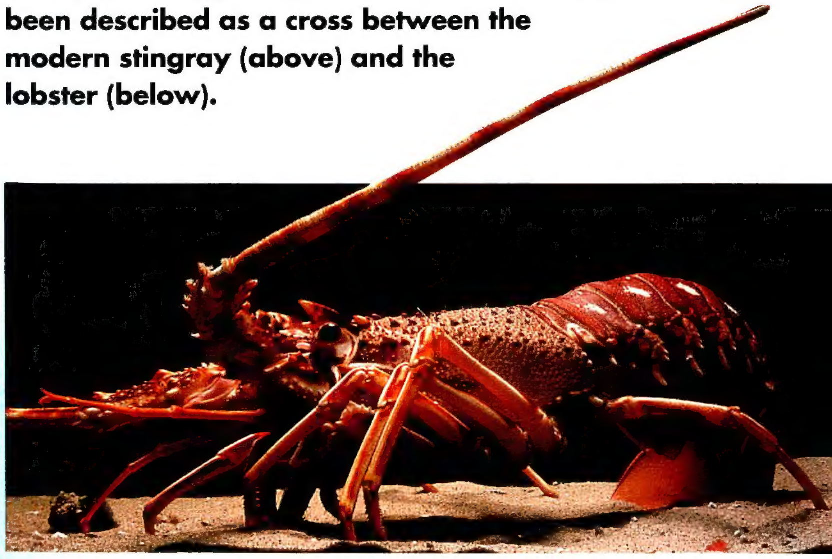
STREAMLINED SWIMMER

Anomalocaris was probably a good swimmer because, as it had no limbs, it had no way of crawling or even walking along the sea bed. Its streamlined body and side paddles must have powered *Anomalocaris* through the water with wave-like movements as it chased ferociously after any small prey that crossed its path.

ONE OF A KIND

As most of its companions on the sea bed were not much longer than your fingers, the arm-sized *Anomalocaris* must have seemed like a real giant in the Cambrian seas. This unique sea creature has no known relatives or descendants. Its 'one-off' design has been described by some as a cross between a lobster and a modern stingray. Scientists have had problems classifying it, and are still puzzling today over which of the animal groups it should really be placed in.

The special body shape of *Anomalocaris* has been described as a cross between the modern stingray (above) and the lobster (below).



IT'S A FACT

HIDDEN SPECIMENS

The 65,000 specimens from 120 different kinds of animal which have been found in the Burgess Shale were not all buried at the same time. Scientists have found five distinct animal communities which were buried over several million years. In geological terms this is just a 'blink' in time, and gives us a fascinating snapshot of animal life hundreds of millions of years ago.

SCUTELLOSAURUS

About the size of today's labrador dog, *Scutellosaurus* carried light armour on its back for protection.

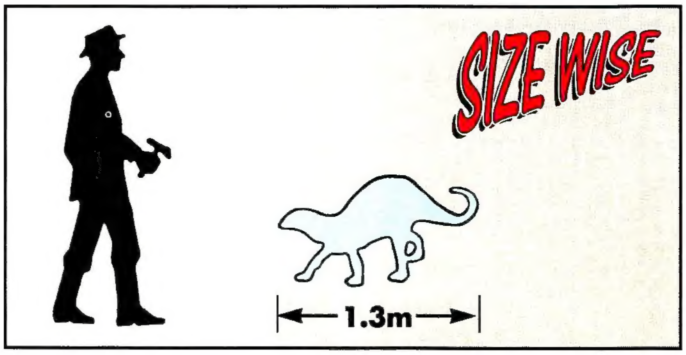
All the way along its low body, *Scutellosaurus* had small, bony studs, or 'scutes', with the largest row along the centre. As it moved among low-growing plants of Jurassic Arizona, *Scutellosaurus'* armoured body made the dinosaur rather 'front-heavy'. Although it ran on two strong hind legs when evading predators, *Scutellosaurus* probably browsed on four legs.

TAIL END

Scutellosaurus had a long tail that took up almost half its total length. When the little dinosaur stood up on its back legs, the heavy tail gave it extra stability.

ON THE RUN

Like its relative, *Lesothosaurus*, this early ornithischian's back legs were longer than its front limbs. It probably ran quite swiftly as it tried to escape carnivores like *Dilophosaurus*.

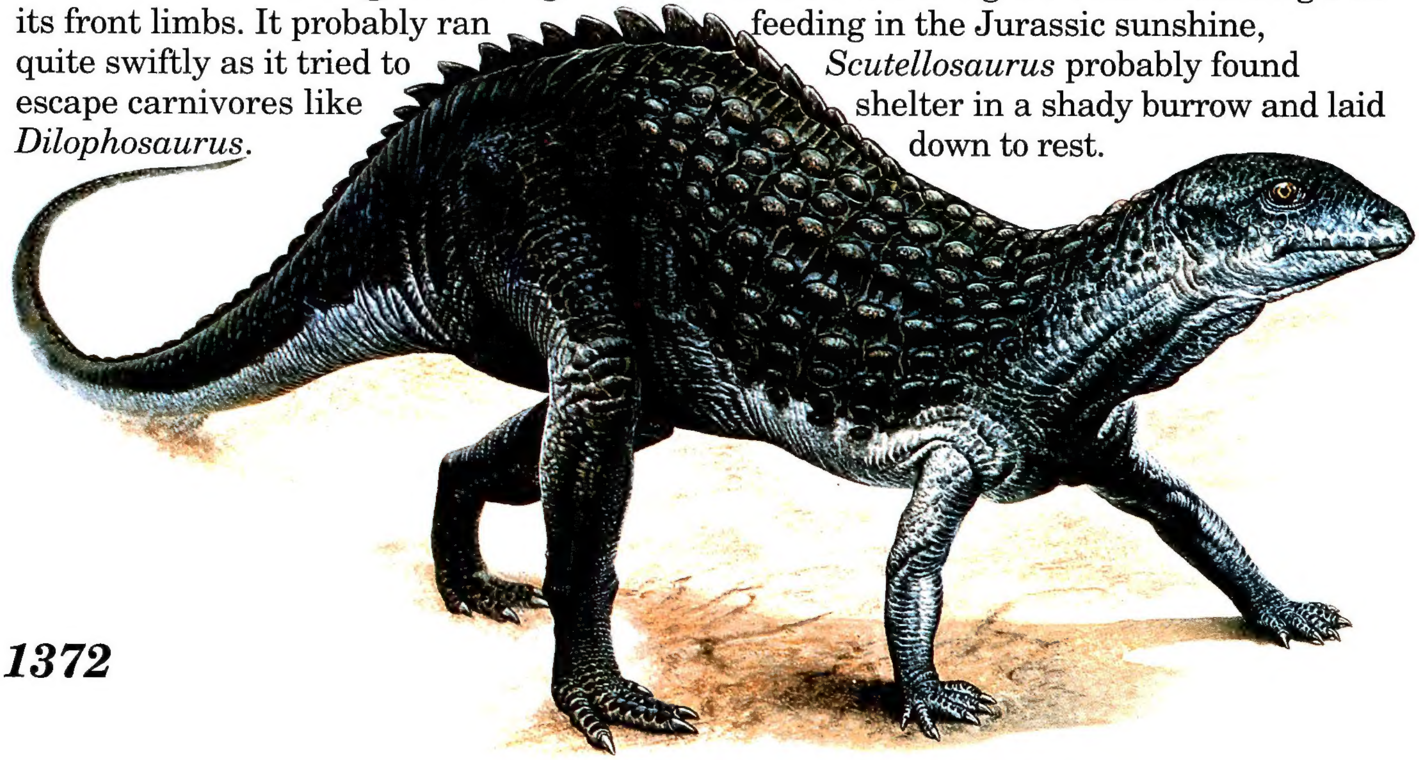


MONSTER FACTS

- **NAME:** *Scutellosaurus* (skoo-tell-oh-saw-rus) means 'small-scaled reptile'
- **GROUP:** dinosaur
- **SIZE:** 1.3m long
- **FOOD:** low-lying plants
- **LIVED:** about 195 million years ago in the Early Jurassic Period in Arizona, North America

FOOD AND SHELTER

Scutellosaurus had a small head and long, slender jaws. It probably grasped twigs and small branches with its large, five-fingered hands and held them to its mouth. When it grew tired of walking and feeding in the Jurassic sunshine, *Scutellosaurus* probably found shelter in a shady burrow and laid down to rest.



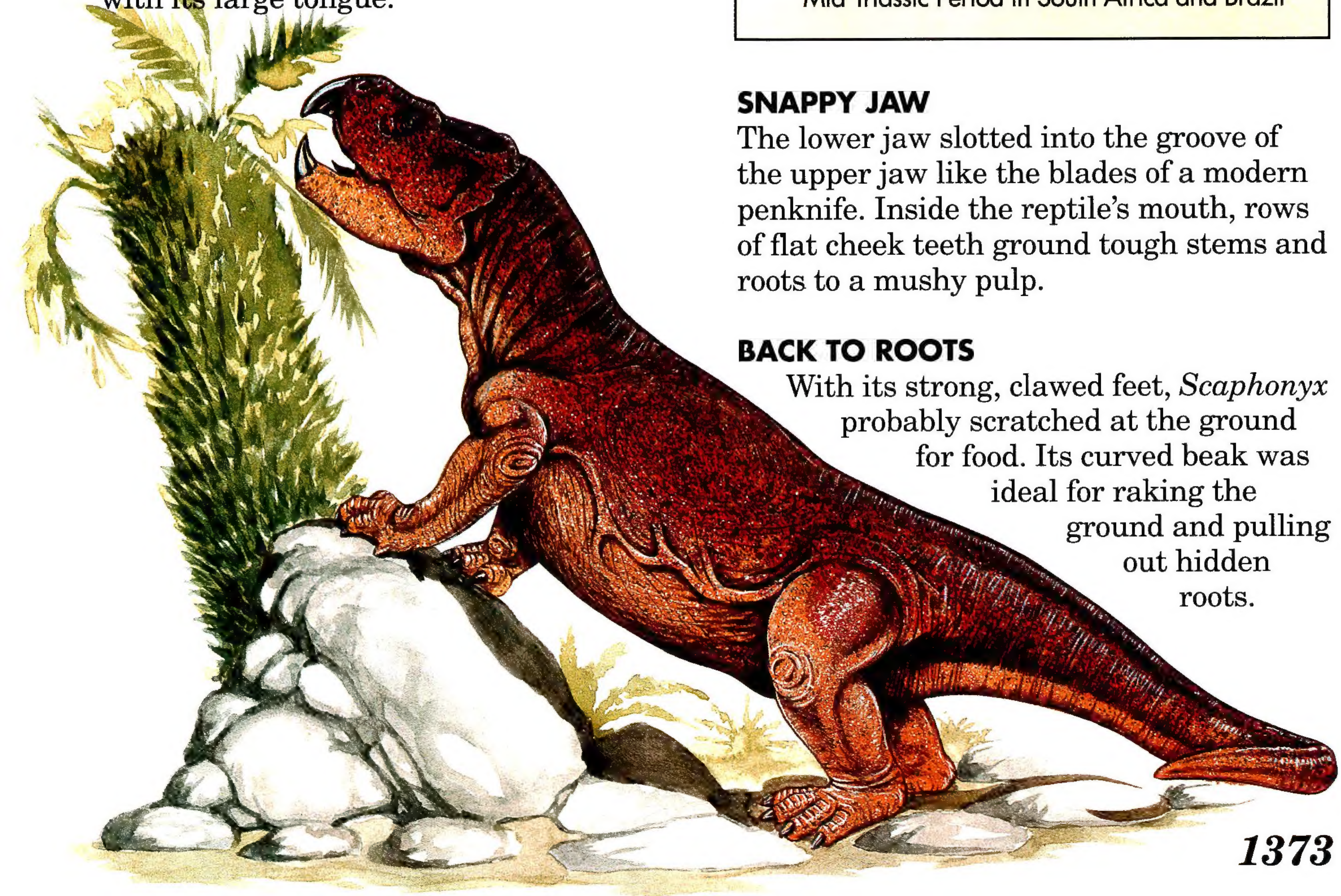
SCAPHONYX

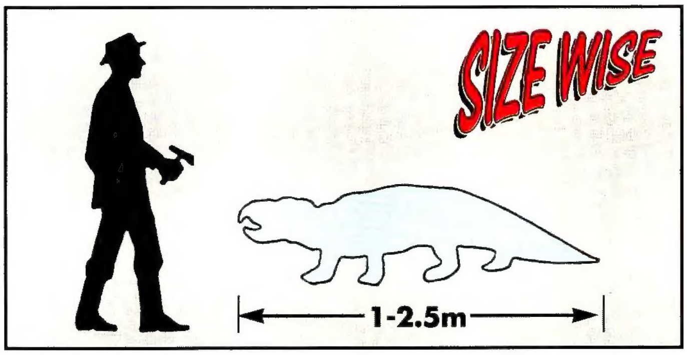
Scaphonyx was a sturdy reptile, able to eat the toughest food.

About as heavy as an average-sized sheep, *Scaphonyx* trundled along on four squat, sprawling legs. It belonged to a family of reptiles called rhynchosaurs, which were named after their 'beaked' heads. These plant-eating animals lived in the Mid-Triassic Period and survived successfully for a short time.

TONGS AND TWIGS

Scaphonyx had a very striking beak which hung down from its face like a pair of tongs. It gathered seeds and twigs in this beak and tucked them inside its mouth with its large tongue.





MONSTER FACTS

- **NAME:** *Scaphonyx* (ska-fon-ix) means 'trough-shaped claw'
- **GROUP:** reptile
- **SIZE:** 1–2.5m long
- **FOOD:** fruits, seeds and roots of plants
- **LIVED:** about 200 million years ago in the Mid-Triassic Period in South Africa and Brazil

SNAPPY JAW

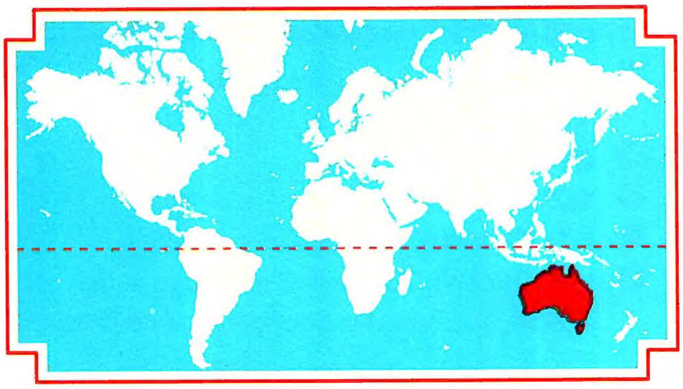
The lower jaw slotted into the groove of the upper jaw like the blades of a modern penknife. Inside the reptile's mouth, rows of flat cheek teeth ground tough stems and roots to a mushy pulp.

BACK TO ROOTS

With its strong, clawed feet, *Scaphonyx* probably scratched at the ground for food. Its curved beak was ideal for raking the ground and pulling out hidden roots.

The Australian Ark

Australia has been an island for 60 million years and its animals have evolved in a unique way.



Kangaroos, wallabies, koalas, wombats, possums, platypuses – Australia has all kinds of unique animals that are just not found anywhere else in the world. And if you think that the modern Australian animals are unusual, just wait until you see the truly strange creatures that lived there in prehistoric times!

DOING THEIR OWN THING

Australia gives us a picture of evolution in complete isolation. The continent has now been a separate island for 60 million years, and during this time evolution has gone its own merry way, which has involved no mixing of any other animals from the outside world.

PRIMITIVE EGG-LAYERS

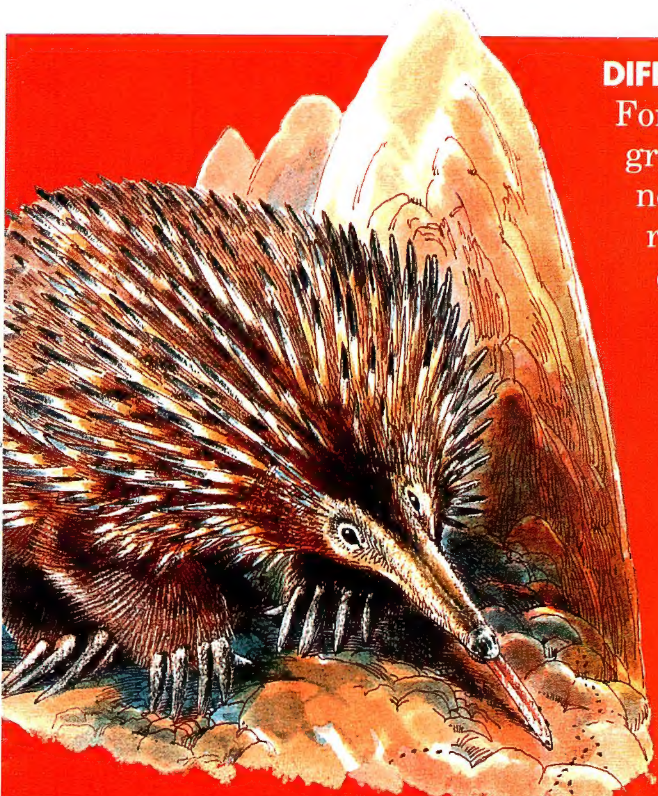
The most primitive Australian animals are the monotremes – mammals which lay eggs. Of these, only the platypus and echidna remain. In the Pleistocene Epoch the giant echidna *Zaglossus* wandered freely and earlier, in Cretaceous times, the platypus *Steropodon* (the oldest known mammal) could be seen.

MARSUPIALS RULE

The most important Australian mammals are the marsupials, or pouched mammals, whose babies are born very tiny. The young are just big enough to crawl into the mother's pouch where they stay until they can fend for themselves.

CONTINENTAL BREAK-UP

Why have the marsupials of Australia survived until today, when they have died out elsewhere? In Cretaceous times, when the marsupials first evolved, Australia, Antarctica and South America were all joined together as one big area. As this continent broke up into individual landmasses, each still had marsupial mammals living on it. But when placental mammals evolved in North America they moved into South America and took over from the marsupials.



DIFFERENT VERSIONS

For example, to live on grasslands an animal needs long legs for running away from enemies, strong teeth and a complex digestive system for eating tough grass. This describes a zebra or an antelope, but also a kangaroo! Over the last 65 million years, Australia has produced marsupial versions of all the existing placental mammals.

The large echidna, *Zaglossus* (above), lived in the Pleistocene Epoch. *Tacyglossus aculeatus*, a close relative (left), still exists today.

The platypus, *Steropodon* (above right), was around in Cretaceous times. The modern duckbilled platypus (right) still lives today.

TOUGH SURVIVORS

Isolated Australia kept on drifting northwards with its cargo of marsupials, which kept adapting continuously to survive the changes in climate and conditions. Unchallenged by any invading placentals from other landmasses, the Australian marsupials remain supreme today. They may look very different from the mammals elsewhere in the world, but they behave in very similar ways.

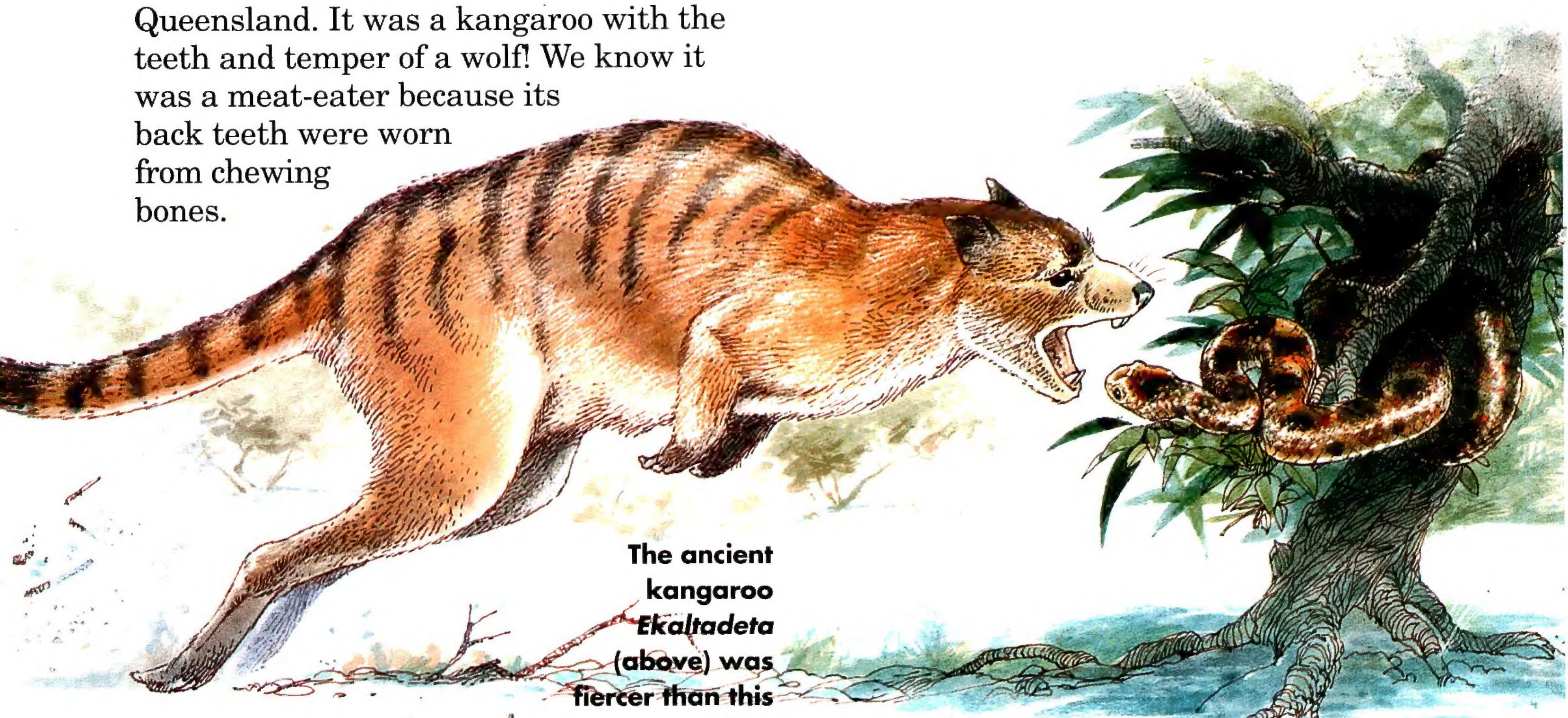
IT'S A FACT

NOT JUST MAMMALS

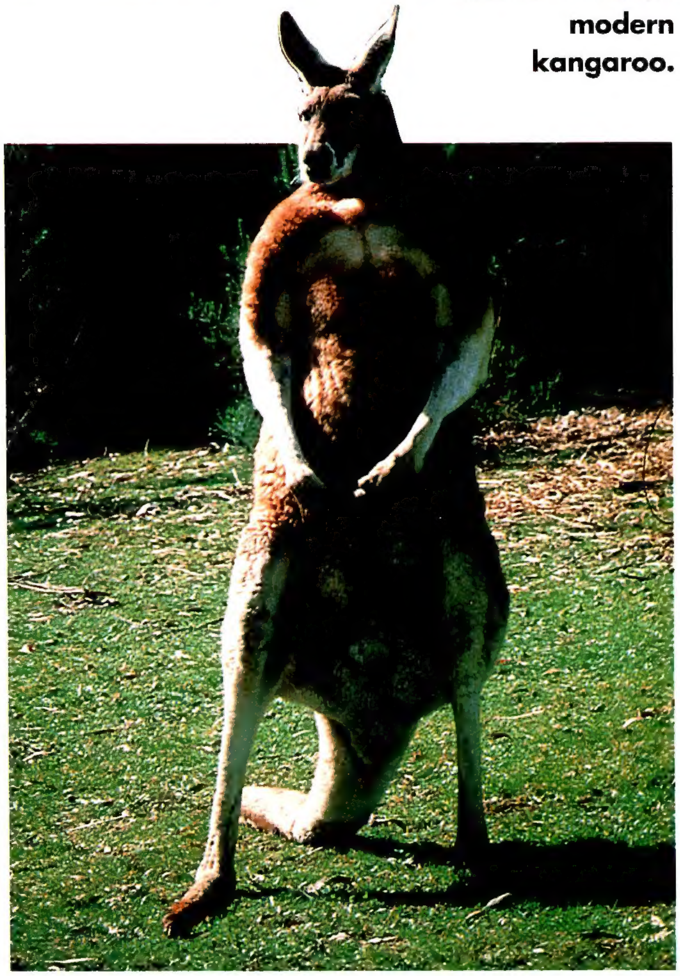
Australia has produced strange birds as well as mammals. Some of the biggest that ever existed were ground-dwellers like *Dromornis* (left). This giant bird looked like today's cassowary, was up to 3m tall, and weighed around 300kg.

KILLEROO

Ekaltadeta lurked in the forests of Miocene Queensland. It was a kangaroo with the teeth and temper of a wolf! We know it was a meat-eater because its back teeth were worn from chewing bones.



The ancient kangaroo ***Ekaltadeta*** (above) was fiercer than this modern kangaroo.



DUMBAT

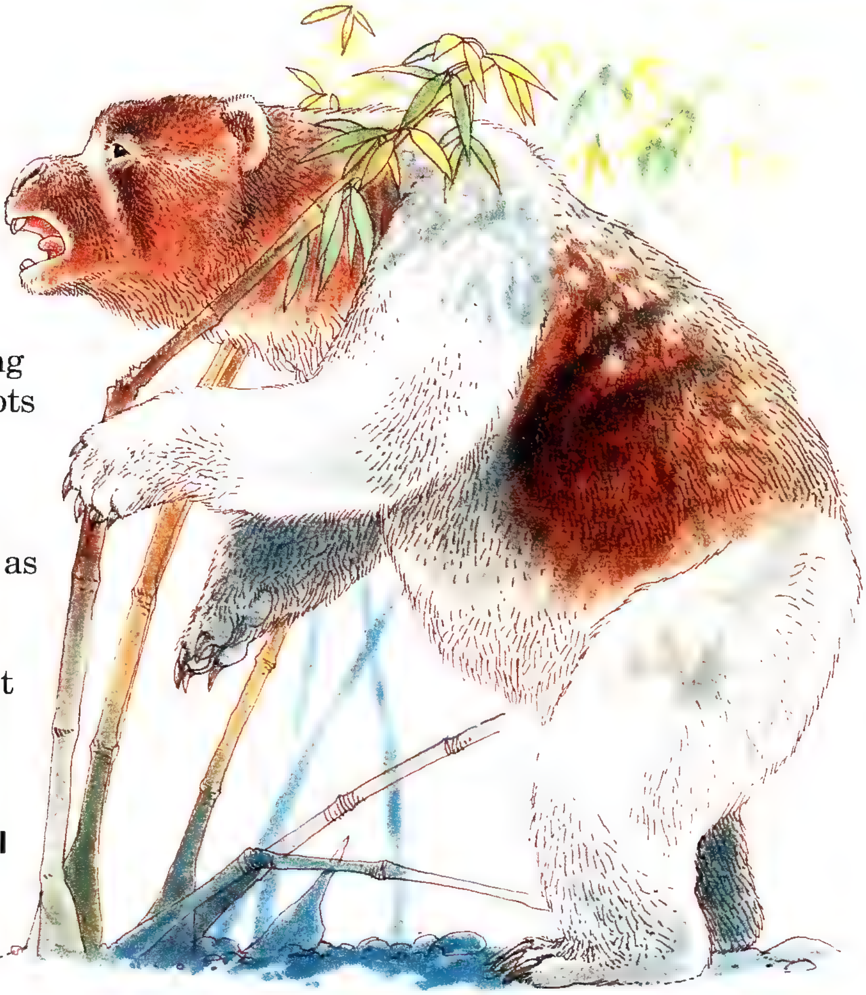
Many of the large plant-eating marsupials belonged to the group we call the diprotodonts. They were a bit like giant wombats. *Neohelos*, from Pleistocene Queensland, was about the size of a cow, and probably wandered in herds in the leafy forests. Its brain was only the size of a tennis ball, so it was probably not the most intelligent of animals.

GIANT PLANT-EATER

The biggest of the plant-eaters was *Diprotodon*. It was 3m long and stood 2m high at the shoulder. It probably lived very much like a rhinoceros of today, wandering through open woodland on its short legs, and browsing. This creature survived until about 10,000 years ago.

PANDA LOOKALIKE

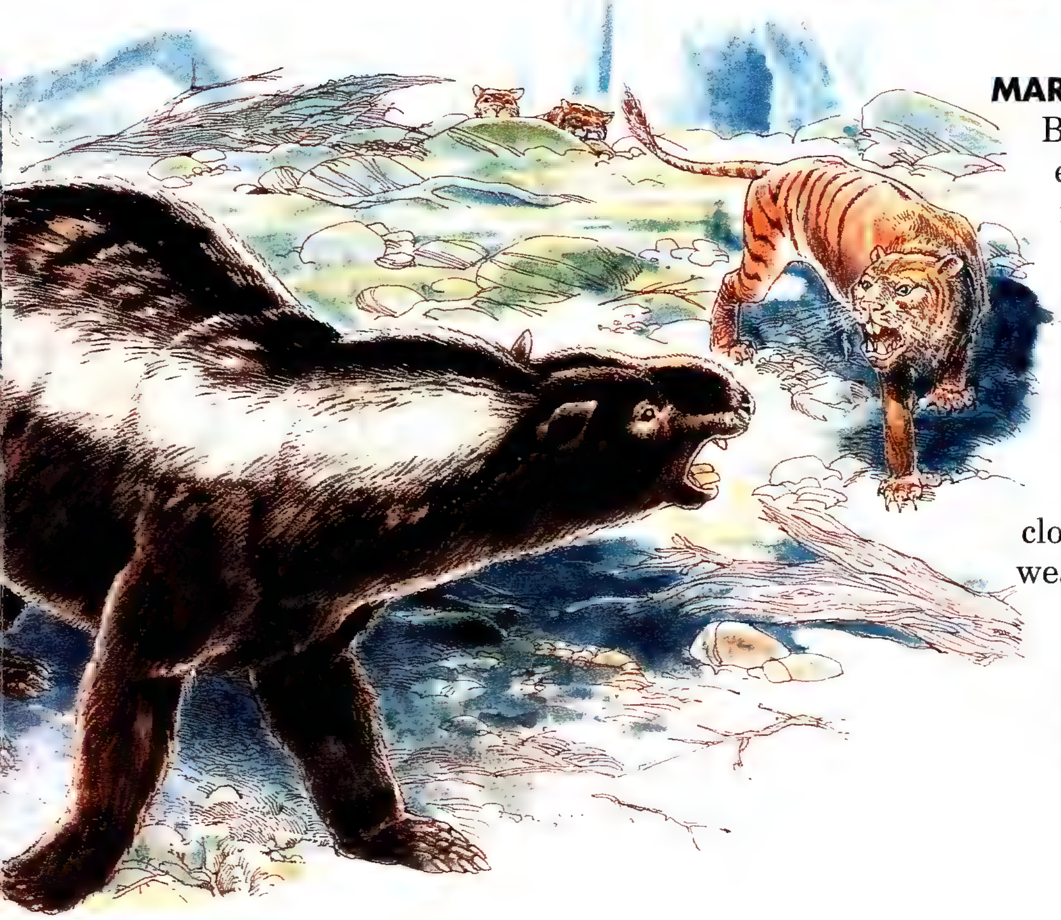
Hulitherium lived in New Guinea during the Pleistocene Epoch. It chewed young bamboo shoots in the highland forests. It had very much the same sort of lifestyle as some of today's animals such as the spectacled bear in South America, the mountain gorilla in Africa and the giant panda in Asia. It was, in effect, the marsupial giant panda.



The ancient giant marsupial panda, *Hulitherium*, lived on bamboo shoots just like today's giant panda (above left).

MARSUPIAL KING

Big Pleistocene beasts were eaten by the lion-sized marsupial hunter *Thylacoleo* whose name means 'pouched lion'. Unlike other hunters, *Thylacoleo* used its front teeth to kill its prey. When this creature was first discovered, scientists thought it gnawed large fruit! But on closer study, the teeth showed wear from chewing meat.

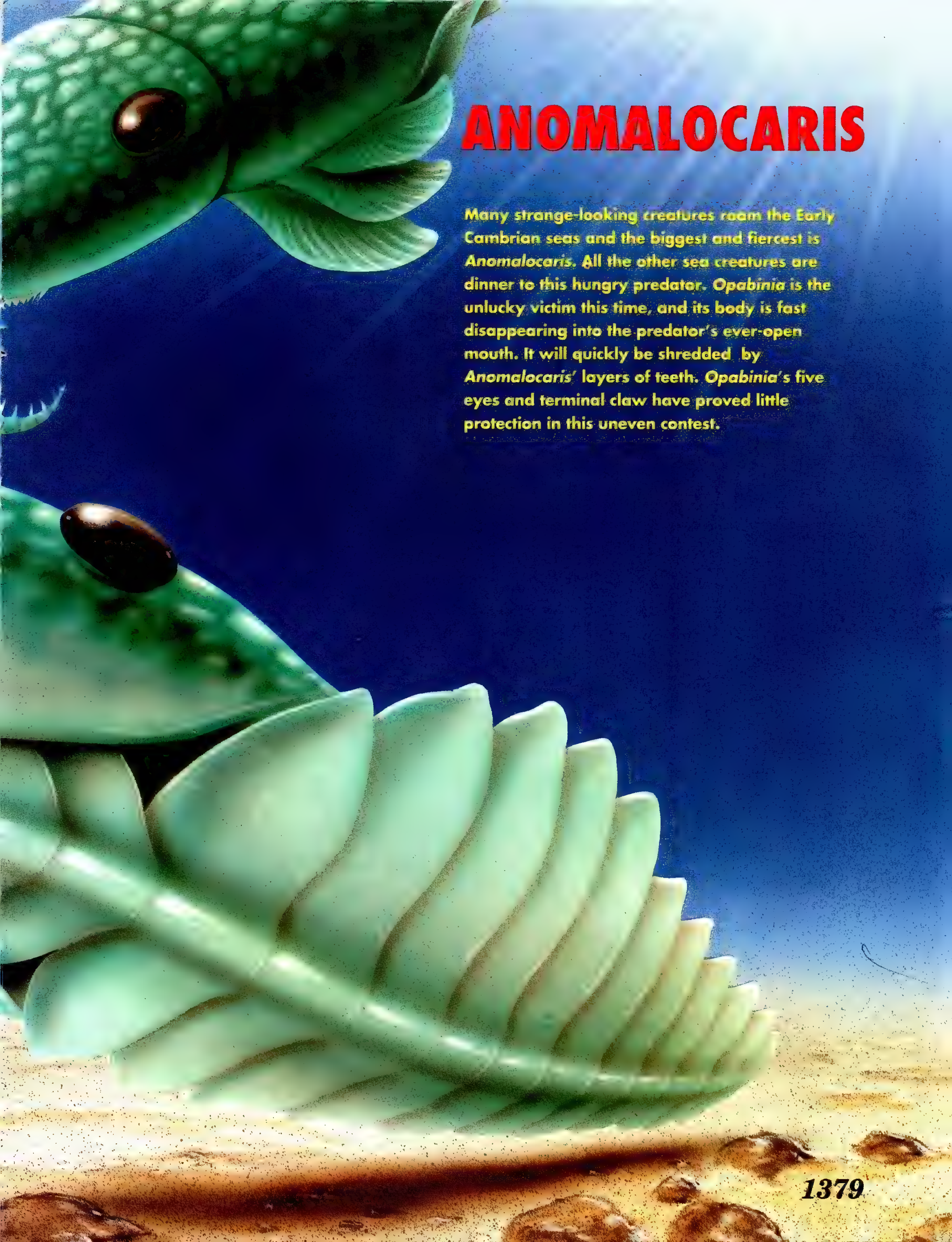


A fierce *Thylacoleo* lioness prepares to attack plant-eating *Diprotodon*, in defence of her cubs.

GIANTS OF THE PAST

ANOMALOCARIS

Many strange-looking creatures roam the Early Cambrian seas and the biggest and fiercest is *Anomalocaris*. All the other sea creatures are dinner to this hungry predator. *Opabinia* is the unlucky victim this time, and its body is fast disappearing into the predator's ever-open mouth. It will quickly be shredded by *Anomalocaris'* layers of teeth. *Opabinia*'s five eyes and terminal claw have proved little protection in this uneven contest.



3-D Gallery 67

CHASMOSAURUS

In the heat of the day in Late Cretaceous New Mexico, a herd of *Chasmosaurus* wallows in the cool waters of a lily pond. Despite their great size and sharp, hooked beaks, these ceratopsid are known to have been plant-eaters.

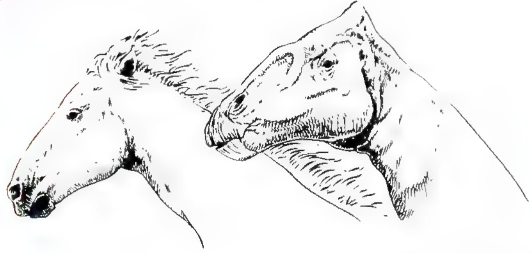
STOP PRESS...

Read all about the latest dinosaur theories!

New theories about dinosaurs are being put forward almost every day. New facts are discovered and new research reported all the time.

BACK TO THE DRAWING-BOARD

Sculptor and palaeontologist Stephen Czerkas has noticed an interesting similarity between the s-shaped bones found in the necks of prehistoric hadrosaurs and those found in modern horses. He thinks that experts may have missed something. Hadrosaurs are usually shown with elegant swan-shaped necks. But if horses and hadrosaurs possess the same shaped neck bones, the Cretaceous plant-eaters probably had shorter, thicker necks. So it may be back to the drawing board for dinosaur illustrators! Some experts say, however, that because horses are mammals, and dinosaurs are reptiles, comparing them is not a good idea.

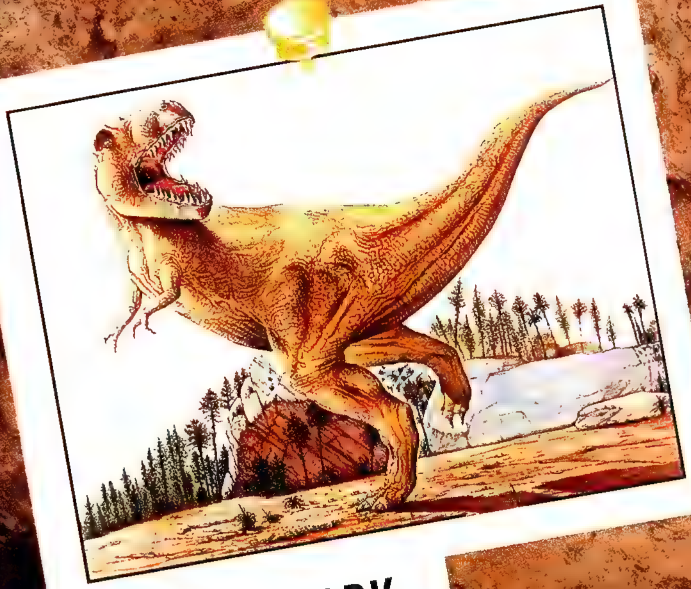


PEE-HISTORIC

US researcher Dr Milton R. Grillingham believes that "every drop of water on Earth used to be urine and 99.9 per cent came from dinosaurs". He estimates that a large sauropod took up to 50 minutes to empty its bladder and that the contents would probably fill a small swimming pool. However, most experts think that this is fantasy because they think that, like most reptiles, dinosaurs did not pee.

IT'S A SMALL WONDER

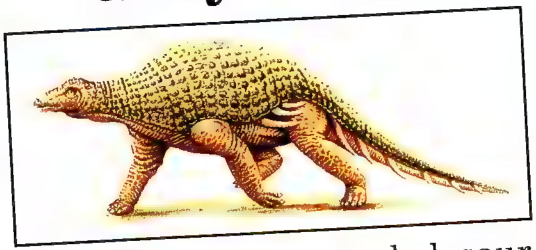
The smallest sauropod ever discovered has been found in Thailand. As yet unnamed, this plant-eater lived in the Late Jurassic Period.



JURASSIC PARK FOR REAL ?

Mary Schweitzer, who worked with Jurassic Park's dinosaur expert Jack Horner, has isolated the red blood cells in a *T rex* leg bone. Researchers in the US are trying to extract DNA from the cells – something that has never been done before.

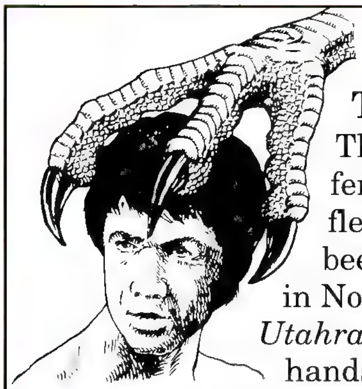
Great-granddad ankylosaur



The earliest known ankylosaur has been found in Utah, USA. This armoured dinosaur from the Late Jurassic was as long as a lion and it is still waiting for a name. It may have looked like this *Silvasaurus*, which was found close by in Kansas.

A DINOSAUR IN THEIR OWN BACKYARD

Experts from the Museum of Natural Sciences in Argentina did not realise until recently what treasures were hidden in their own backyard. The 70 million-year-old remains of a dog-sized carnivore were buried right under their noses. It has been named *Alvarezsaurus*.

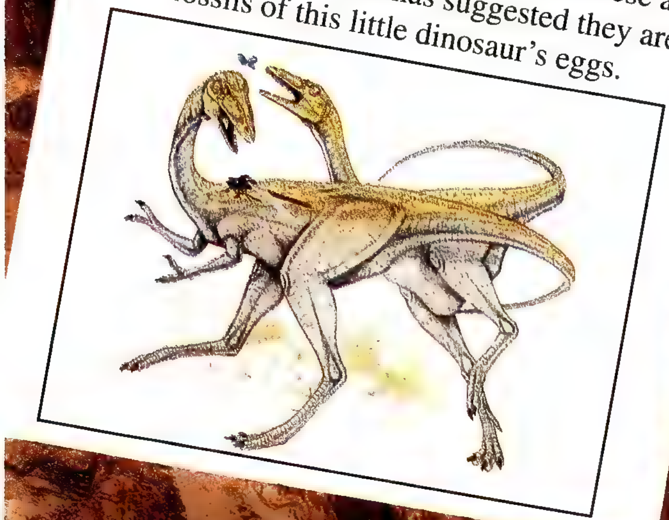


BORN TO KILL

The most ferocious of all flesh-eaters has been discovered in North America. *Utahraptor*'s clawed hands were big enough to fit around a human head. One expert described this predator, which lived over 130 million years ago, as a "night-mare cross between Freddy (in the film 'A Nightmare on Elm Street') and Bruce Lee".

A SURPRISE FOR THE EGGSPERTS

Only two skeletons of *Compsognathus* have been found so far. The remains of one had some strange-shaped globules preserved near its skeleton. Scientists have found these a puzzle, but now one has suggested they are fossils of this little dinosaur's eggs.



The little bird-hip

Small dinosaurs darted across the hot, dry plains 200 million years ago. These early plant-eaters were the bird-hipped dinosaurs.

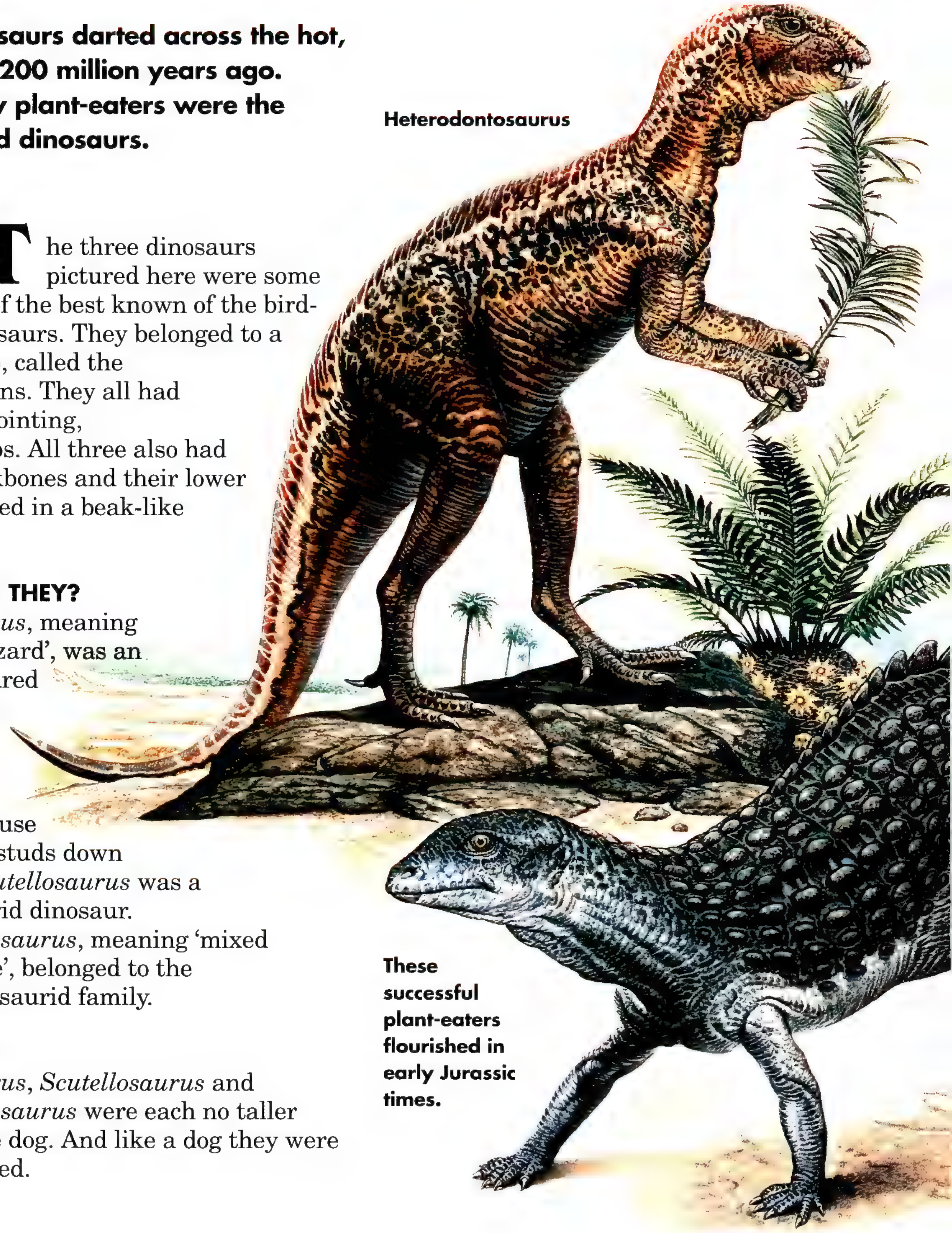
The three dinosaurs pictured here were some of the best known of the bird-hipped dinosaurs. They belonged to a major group, called the ornithischians. They all had backward-pointing, bird-like hips. All three also had similar backbones and their lower jaws all ended in a beak-like bony tip.

WHO WERE THEY?

Lesothosaurus, meaning 'Lesotho's lizard', was an early armoured fabrosaurid. Named the 'small-shield lizard', because of the bony studs down its back, *Scutellosaurus* was a scutellosaurid dinosaur. *Heterodontosaurus*, meaning 'mixed tooth reptile', belonged to the heterodontosaurid family.

DOG-SIZED

Lesothosaurus, *Scutellosaurus* and *Heterodontosaurus* were each no taller than a large dog. And like a dog they were all fleet footed.



These successful plant-eaters flourished in early Jurassic times.

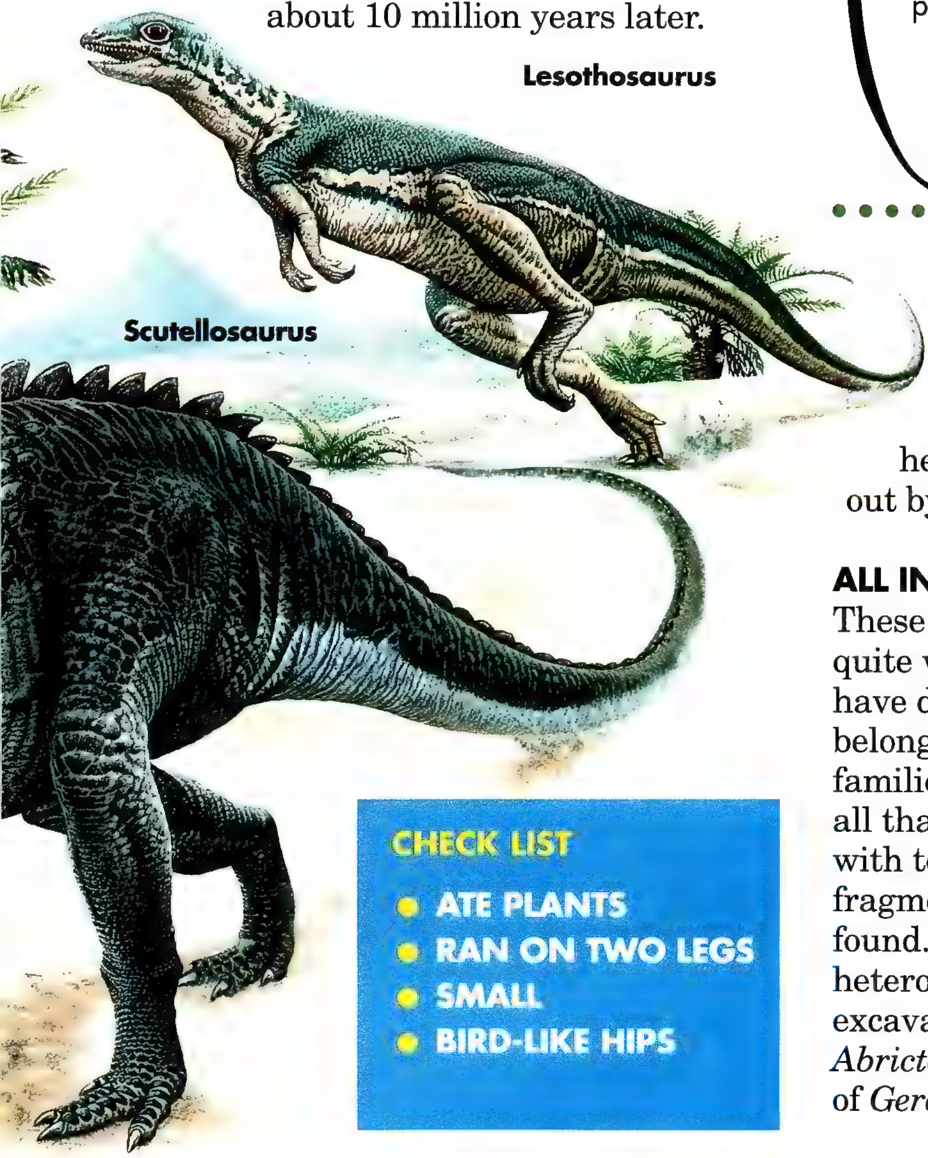
ped plant-eaters

LONG AND LOW

Scutellosaurus grew up to 134cm long and half of its length was its tail. *Heterodontosaurus* was slightly shorter at 120cm. *Lesothosaurus* was just 90cm long – about the same size as a skateboard.

EARLY STARTERS

Scutellosaurus and *Lesothosaurus* were first on the scene. They appeared early in the Jurassic Period, about 200 million years ago. *Heterodontosaurus* arrived about 10 million years later.



CHECK LIST

- ATE PLANTS
- RAN ON TWO LEGS
- SMALL
- BIRD-LIKE HIPS

IT'S A FACT

NAME CHANGE

When experts dug up an almost complete fabrosaurid skeleton in the 1970s, they called it *Fabrosaurus*. But later the name was changed to *Lesothosaurus* because scientists decided that there was not enough evidence to link this new find with the only remains of *Fabrosaurus* previously discovered, which was a bit of jaw with teeth.

DISAPPEARED

These bird-hips were successful plant-eaters and flourished throughout the northern hemisphere. But they had all died out by 180 million years ago.

ALL IN THE FAMILY

These three dinosaurs are known from quite well preserved skeletons. But experts have discovered scattered fossil fragments belonging to further members of these families. A single broken jaw with teeth is all that exists of *Fabrosaurus*. A few jaws with teeth of *Echinodon*, and tooth fragments of *Alocodon*, have also been found. Experts have identified more heterodontosaurids too. They have excavated a skull belonging to *Abrictosaurus* and small pieces of the jaws of *Geranosaurus* and *Lycorhinus*.

1 ONE IN THREE

Heterodontosaurus was so called because, unlike most other dinosaurs and reptiles, it had three kinds of teeth. This small plant-eater had sharp cutting teeth at the front. It had tusk-like fangs behind and broad, ridged teeth at the back. Each type of tooth did a different job. The pointed teeth on its upper front jaw worked with its lower 'beak' to nip off leaves. Its sharp fangs could shred tough vegetation, which was then ground up with its back teeth.

CHOPPING...

Fabrosaurids simply chopped their food up. But heterodontosaurids were able to chew the vegetation they ate. That meant they could digest it more quickly. *Lesothosaurus* had slender, leaf-like teeth which it used to shred shoots. It swallowed the bits and digested them slowly in its large stomach.

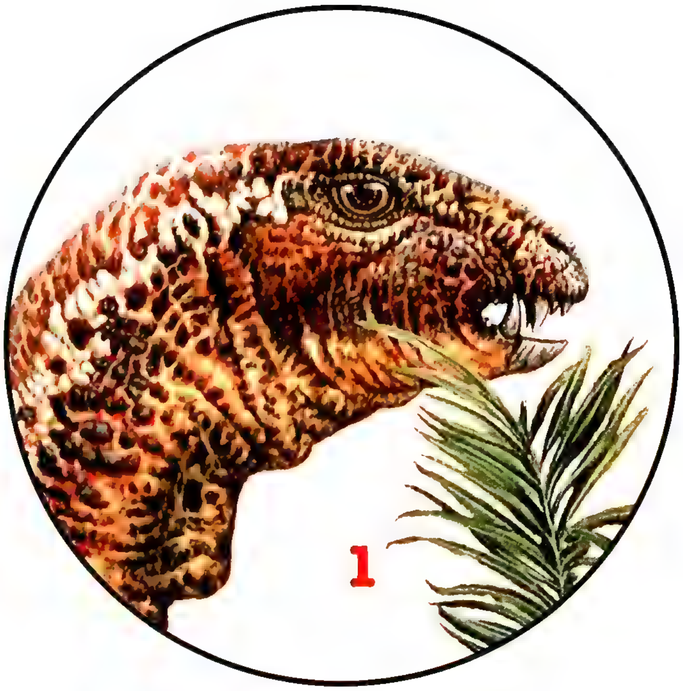
...AND CHEWING

Heterodontosaurus was a much more efficient eater. It used its special cheek teeth to chew plants. This dinosaur could hold the bits in its fleshy cheek pouches so they didn't drop out of its mouth while it chewed.

TUSKERS

Heterodontosaurids are remarkable for their tusk-like front teeth. They may have used them, like modern warthogs do, to defend themselves against attack as well as to eat.

CHECK LIST
- BEAK-LIKE LOWER JAWS
- LONG, SLENDER HIND LEGS
- LONG, STIFF TAILS



2 BALANCING TAIL

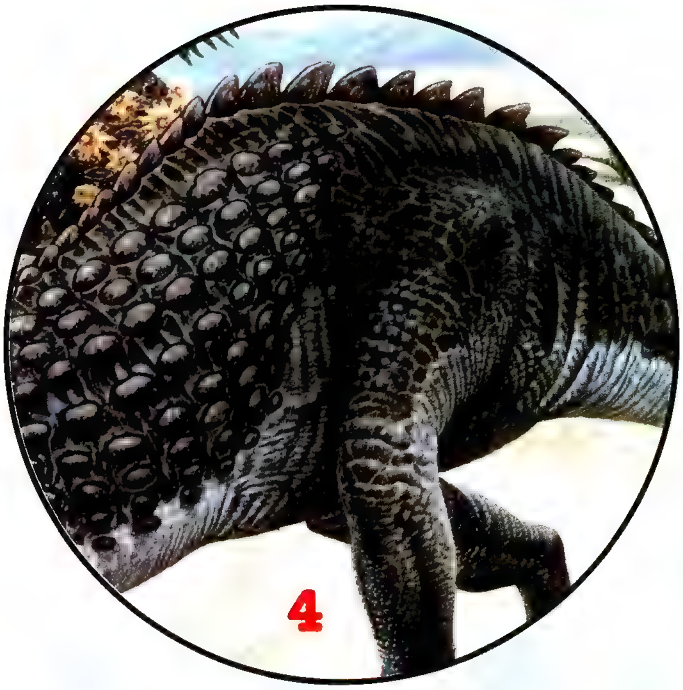
The early plant-eaters were easy prey for hungry meat-eating dinosaurs. The plant-eaters relied on their long, powerful hind legs to outrun their slower attackers. *Lesothosaurus* had hollow bones, like a bird, so it had a light body. It used its long tail to counterbalance its body so that it could stand and run swiftly on its hind legs.

3 UP AND DOWN

Heterodontosaurus and *Lesothosaurus* had long, slender foot bones. These bones did not need to be very strong because both dinosaurs were small and light. The shape of their hind feet shows that both were speedy runners. *Scutellosaurus* probably sprinted along on its hind legs, too. But it had longer arms, so experts think it might have fed and rested on all-fours.

DEEP SLEEP

Experts believe these early plant-eaters might have slept, or aestivated, during the dry season. A pair of *Lesothosaurus* skeletons was found curled up and surrounded by worn teeth. The skulls contained a full set of teeth. Scientists think the dinosaurs might have slept away the hottest, driest months, just as many modern creatures do. They could have shed their teeth and grown new ones as they slept. Heterodontosaurids may have aestivated, too. But some experts think there is not enough evidence to prove it.



4 SHELL SHOCK

Scutellosaurus was unusual because it was covered in bony plates, rather like a modern crocodile. If it was cornered, the dinosaur could have used its body armour as a means of defence.

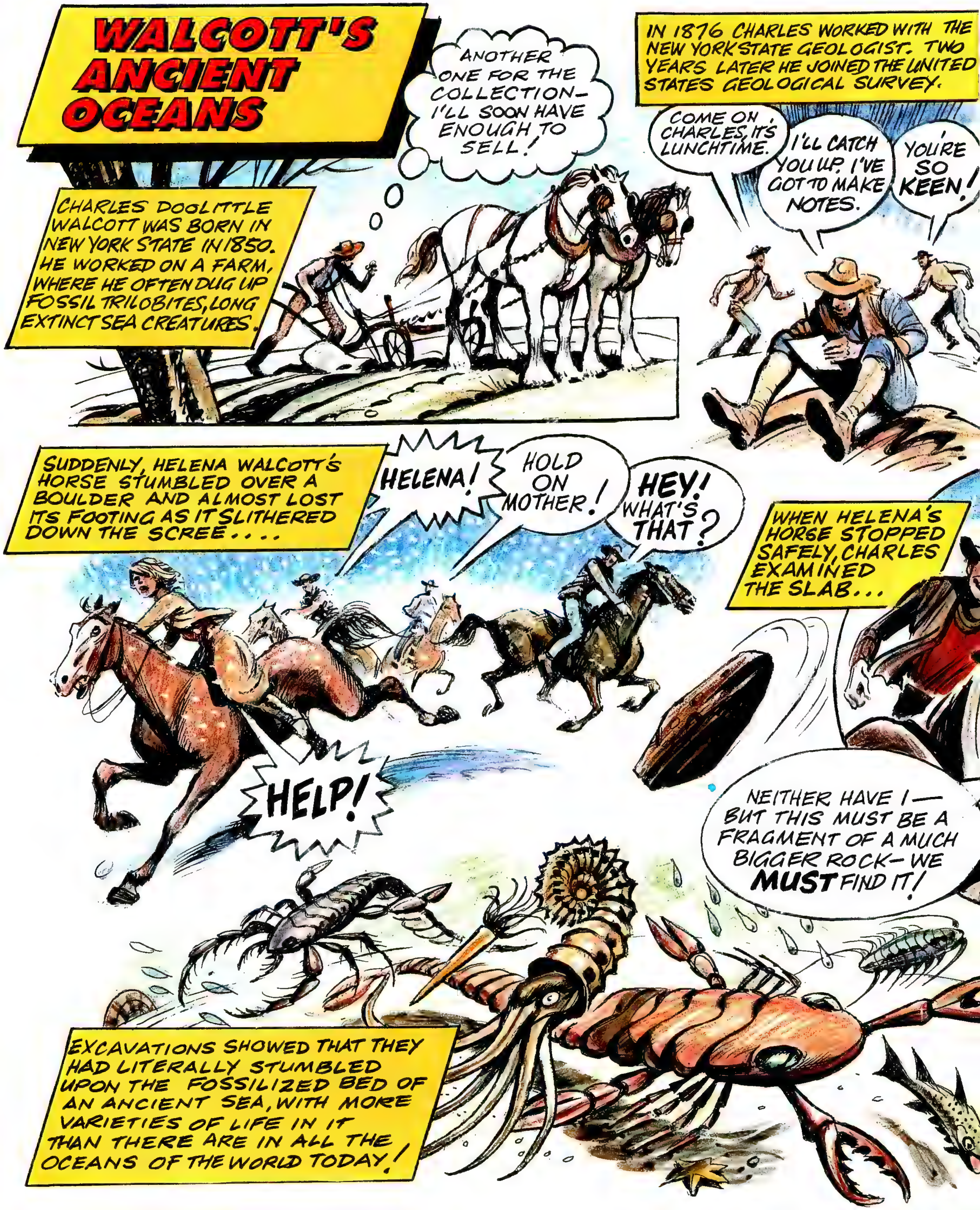
HIS AND HERS

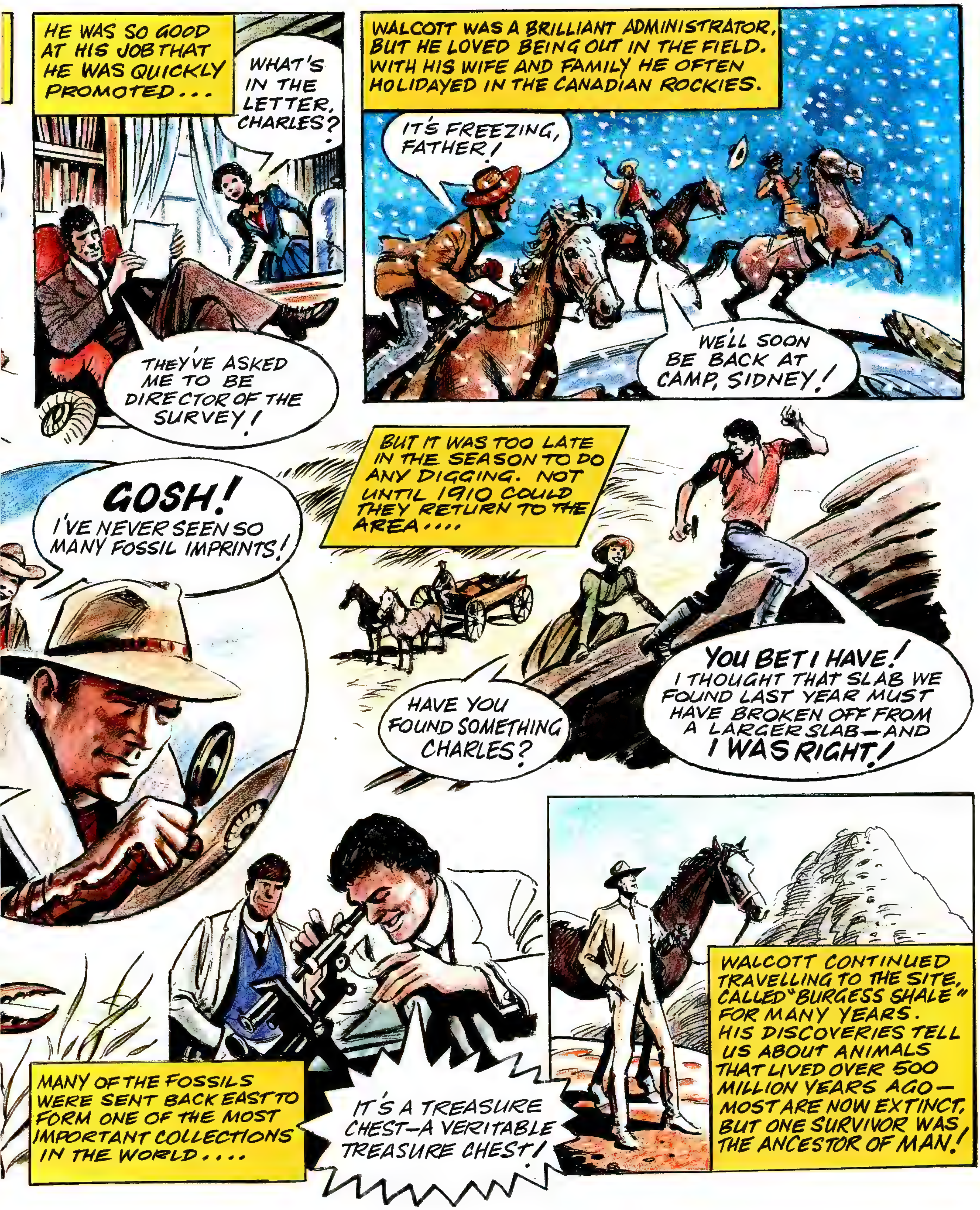
Scientists were puzzled when they found a heterodontosaurid called *Abrictosaurus* which had no tusks. They now think it may have been a female *Heterodontosaurus*. Today's male musk deer have tusks but the females have none. *Heterodontosaurus* and *Abrictosaurus* may have been the male and female of the same species.

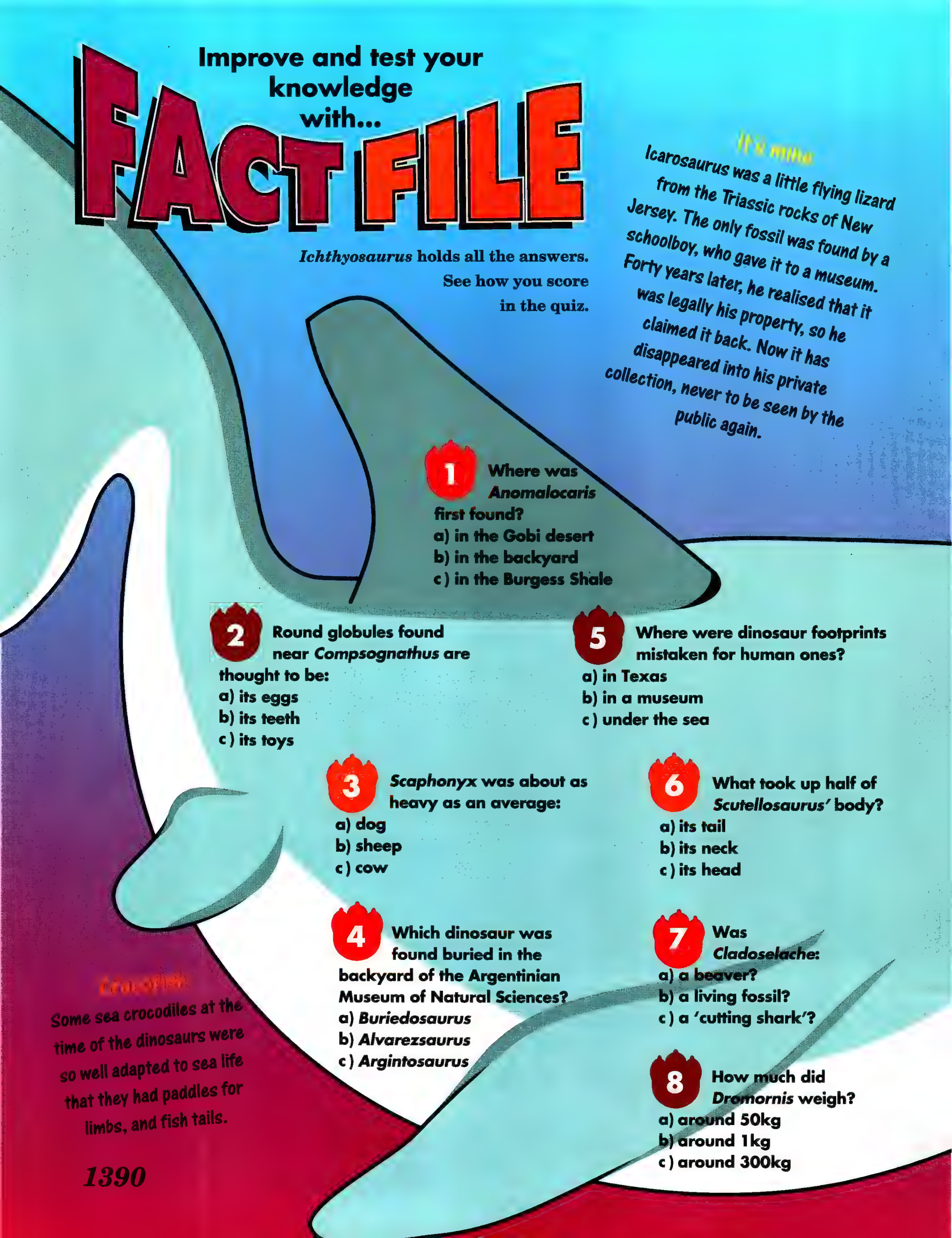
Is it true that heterodontosaurids fed on very tough plants?

Yes, probably. Heterodontosaurid teeth have been found which are very worn down. Experts say this could have happened as a result of the dinosaurs eating hard, spiky shoots and leaves.

WALCOTT'S ANCIENT OCEANS


CHARLES DOOLITTLE WALCOTT WAS BORN IN NEW YORK STATE IN 1850. HE WORKED ON A FARM, WHERE HE OFTEN DUG UP FOSSIL TRILOBITES, LONG EXTINCT SEA CREATURES.
ANOTHER ONE FOR THE COLLECTION— I'LL SOON HAVE ENOUGH TO SELL!
IN 1876 CHARLES WORKED WITH THE NEW YORK STATE GEOLOGIST. TWO YEARS LATER HE JOINED THE UNITED STATES GEOLOGICAL SURVEY.
COME ON, CHARLES, IT'S LUNCHTIME.
I'LL CATCH YOU UP, I'VE GOT TO MAKE NOTES.
YOU'RE SO KEEN!
SUDDENLY, HELENA WALCOTT'S HORSE STUMBLED OVER A BOULDER AND ALMOST LOST ITS FOOTING AS IT SLITHERED DOWN THE SCREE....
HELENA!
HOLD ON MOTHER!
HEY! WHAT'S THAT?
HELP!
WHEN HELENA'S HORSE STOPPED SAFELY, CHARLES EXAMINED THE SLAB...
NEITHER HAVE I— BUT THIS MUST BE A FRAGMENT OF A MUCH BIGGER ROCK— WE MUST FIND IT!
EXCAVATIONS SHOWED THAT THEY HAD LITERALLY STUMBLED UPON THE FOSSILIZED BED OF AN ANCIENT SEA, WITH MORE VARIETIES OF LIFE IN IT THAN THERE ARE IN ALL THE OCEANS OF THE WORLD TODAY!


HE WAS SO GOOD AT HIS JOB THAT HE WAS QUICKLY PROMOTED...
WHAT'S IN THE LETTER, CHARLES?
THEY'VE ASKED ME TO BE DIRECTOR OF THE SURVEY!
WALCOTT WAS A BRILLIANT ADMINISTRATOR, BUT HE LOVED BEING OUT IN THE FIELD. WITH HIS WIFE AND FAMILY HE OFTEN HOLIDAYED IN THE CANADIAN ROCKIES.
IT'S FREEZING, FATHER!
WE'LL SOON BE BACK AT CAMP, SIDNEY!
GOSH! I'VE NEVER SEEN SO MANY FOSSIL IMPRINTS!
BUT IT WAS TOO LATE IN THE SEASON TO DO ANY DIGGING. NOT UNTIL 1910 COULD THEY RETURN TO THE AREA....
HAVE YOU FOUND SOMETHING CHARLES?
YOU BET I HAVE! I THOUGHT THAT SLAB WE FOUND LAST YEAR MUST HAVE BROKEN OFF FROM A LARGER SLAB—AND I WAS RIGHT!
MANY OF THE FOSSILS WERE SENT BACK EAST TO FORM ONE OF THE MOST IMPORTANT COLLECTIONS IN THE WORLD....
IT'S A TREASURE CHEST—A VERITABLE TREASURE CHEST!
WALCOTT CONTINUED TRAVELLING TO THE SITE, CALLED "BURGESS SHALE" FOR MANY YEARS. HIS DISCOVERIES TELL US ABOUT ANIMALS THAT LIVED OVER 500 MILLION YEARS AGO—MOST ARE NOW EXTINCT, BUT ONE SURVIVOR WAS THE ANCESTOR OF MAN!



Improve and test your knowledge with...

FACT FILE

Ichthyosaurus holds all the answers. See how you score in the quiz.

It's mine

Icarosaurus was a little flying lizard from the Triassic rocks of New Jersey. The only fossil was found by a schoolboy, who gave it to a museum. Forty years later, he realised that it was legally his property, so he claimed it back. Now it has disappeared into his private collection, never to be seen by the public again.

1 Where was *Anomalocaris* first found?
a) in the Gobi desert
b) in the backyard
c) in the Burgess Shale

2 Round globules found near *Compsognathus* are thought to be:
a) its eggs
b) its teeth
c) its toys

3 *Scaphonyx* was about as heavy as an average:
a) dog
b) sheep
c) cow

4 Which dinosaur was found buried in the backyard of the Argentinian Museum of Natural Sciences?
a) *Buriedosaurus*
b) *Alvarezsaurus*
c) *Argintosaurus*

5 Where were dinosaur footprints mistaken for human ones?
a) in Texas
b) in a museum
c) under the sea

6 What took up half of *Scutellosaurus'* body?
a) its tail
b) its neck
c) its head

7 Was *Cladoselache*:
a) a beaver?
b) a living fossil?
c) a 'cutting shark'?

8 How much did *Dromornis* weigh?
a) around 50kg
b) around 1kg
c) around 300kg

[illegible]

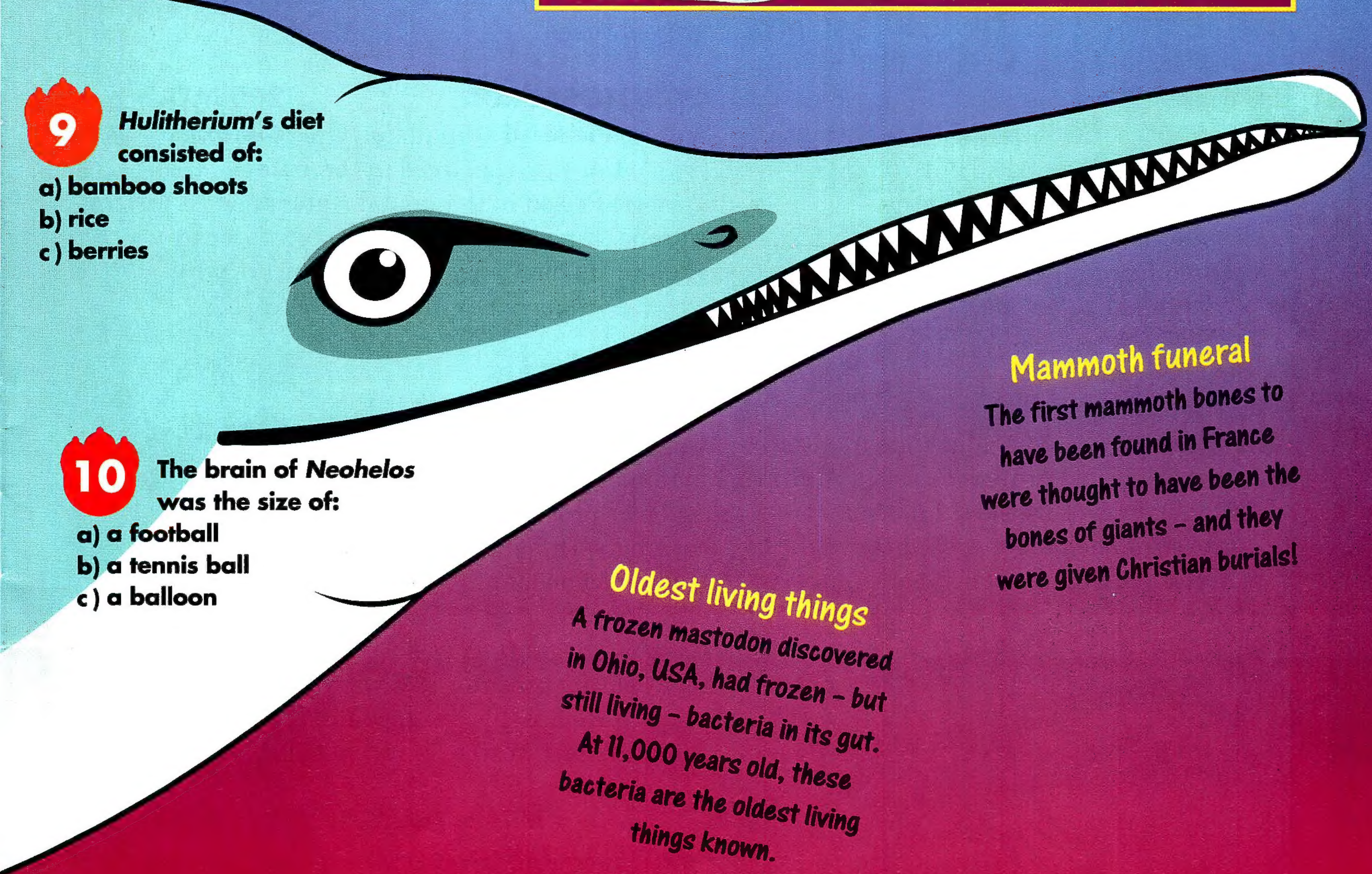
Some sea crocodiles at the time of the dinosaurs were so well adapted to sea life that they had paddles for limbs, and fish tails.

Beefy bison stew

In 1984 the Swedish palaeontologist Bjorn Kurten made stew from the flesh of a 30,000-year-old frozen bison. He found it "agreeable...with an unmistakable beefy aroma".

Hands down

Hadrosaurs had broad 'hands' which were padded underneath to protect the foot as the dinosaur walked. These pads left a smooth, curved print which once misled scientists into thinking that hadrosaurs, such as Edmontosaurus, had webbed fingers.



9 ***Hulitherium*'s diet consisted of:**

a) bamboo shoots
b) rice
c) berries

10 **The brain of *Neohelos* was the size of:**

a) a football
b) a tennis ball
c) a balloon

Mammoth funeral

The first mammoth bones to have been found in France were thought to have been the bones of giants – and they were given Christian burials!

Oldest living things

A frozen mastodon discovered in Ohio, USA, had frozen – but still living – bacteria in its gut. At 11,000 years old, these bacteria are the oldest living things known.

Answers to the questions on inside back cover

A to Z OF PREHISTORIC ANIMALS CL – CY

CLADOSELACHE **370 MYA**

Cladoselache (klad-oh-cel-laki) was a small, early shark. Its torpedo-shaped body was about as long as a beaver's and it lived in the seas of Europe and North America. *Cladoselache* ate fish and, when experts examined the fossilized contents of its gut, they found that it also ate its own kind. *Cladoselache*'s snout was rounder than a modern shark's and its fins were broader. Its name means 'cutting shark'.

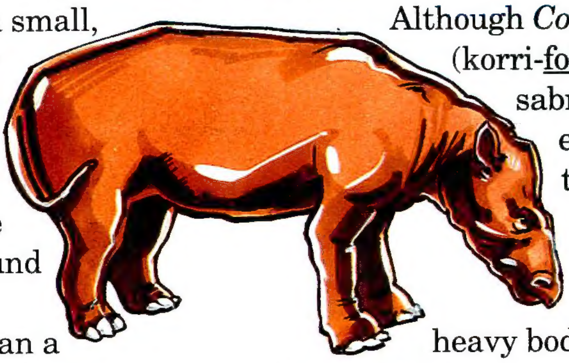
COELACANTH **350 MYA**

Experts got a huge surprise in 1938 when this bony fish was found off the south-east coast of Africa. Coelacanths (seel-ah-canth) were thought to have died out 70 million years ago! This survivor from the Carboniferous Period measures up to 1.8m long when fully grown. The earliest fossils are 350 million years old.

COELUROSAURAVUS **280 MYA**

A lightly built early reptile, *Coelurosauravus* (seel-oo-roh-saw-ra-vus) glided gently from tree to tree in the Permian forests of Europe and Madagascar. Experts think that *Coelurosauravus* had long, skin-covered ribs that stuck out from its sides like Concorde's wings.

CORYPHODON **60 MYA**

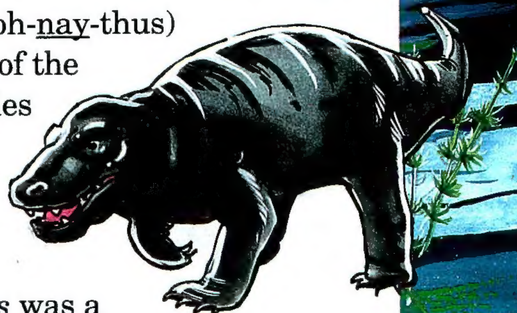


Although *Coryphodon* (korri-foh-don) had sabre-like teeth, experts believe that it only used these for defence. *Coryphodon*'s heavy body was as long as a small car. It had a large head and wide jaws. This plant-eater lived in North America, Europe and Asia. Its name means 'curved tusks'.

CYCLOTOSAURUS **200 MYA**

A crocodile-sized amphibian, *Cyclotosaurus* (sy-clo-toh-saw-rus) lived in the Late Triassic Period in the inland waters of Europe. It needed the buoyancy of water to support its heavy body as its legs were very weak. *Cyclotosaurus* means 'circle reptile'.

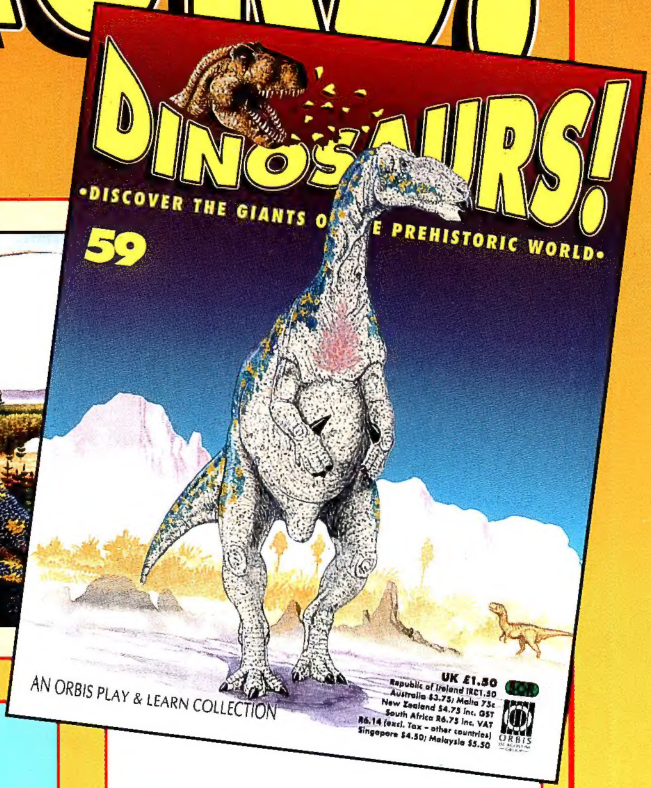
CYNOGNATHUS **220 MYA**



Cynognathus (sy-noh-nay-thus) was one of the last of the mammal-like reptiles and was probably covered with hair. It was a cynodont, which means 'dog teeth'. *Cynognathus* was a meat-eating predator and was as big as a modern wolf, with sharp, pointed fangs. It ran quite fast in spite of its short legs.

MYA = MILLION YEARS AGO

COMING IN PART 59 OF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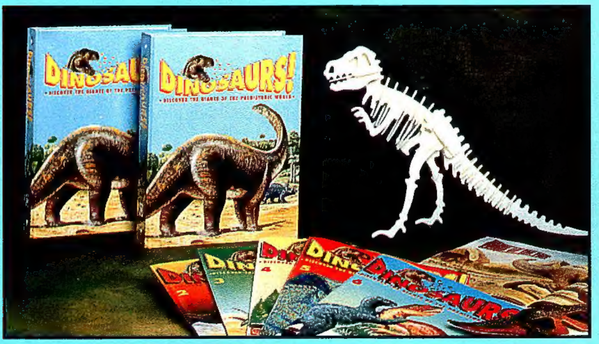

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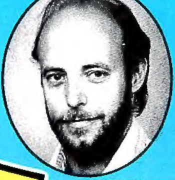
ANSWERS TO FACT FILE QUESTIONS: 1.c 2.a 3.b 4.b 5.a 6.a 7.c 8.c 9.a 10.b



Dr. David Norman of Cambridge University answers your dinosaur questions

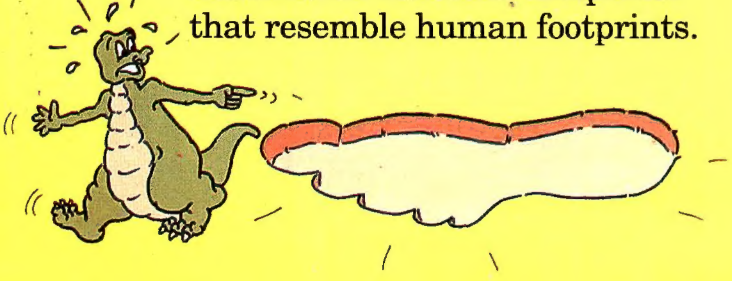
ASK THE EXPERT

If there were dinosaurs in Alaska and Antarctica, how did they survive the cold?

Curiously enough, it was not as cold as you might think in Antarctica, or inside the Arctic Circle. At the time of the dinosaurs there was no ice covering either the North or the South Pole. The trees that grew at the time in these areas were deciduous, which means they shed their leaves each year, and this suggests a climate with warm summers. Dinosaurs were probably summer migrants that went there to eat the abundant plant growth and then moved away in the dark winters.

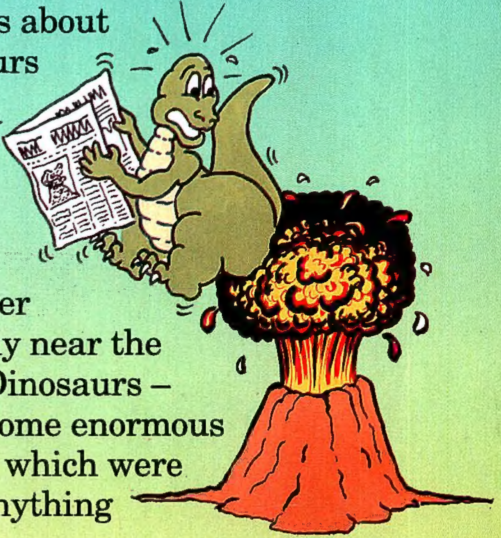
In Texas there is supposed to be a rock that has human footprints beside dinosaur footprints. Is this true?

This is a very old story which has been used by people known as 'creationists' who do not believe in evolution, or the history of life on Earth based on fossil records. The claim that human footprints are found among dinosaur footprints comes from the incorrect identification of weathered carnivorous dinosaur footprints that resemble human footprints.



Were there more volcanoes in dinosaur times?

Dinosaurs lived for such a long period of time (about 160 million years) that it is very unwise to make general statements about things like dinosaurs and volcanoes. There were times when dinosaurs lived when there were not many volcanoes, and other times – particularly near the end of the Age of Dinosaurs – when there were some enormous volcanic eruptions which were far greater than anything we see today.



Did dinosaurs ever eat insects?

It seems likely that the smaller dinosaurs, such as *Compsognathus*, ate insects as part of their regular diet for at least part of the time. However, it also seems very likely that baby dinosaurs would have eaten insects regularly. Today, insects certainly feature in the diets of young crocodiles and are actually a very nourishing source of food.

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